

# EMPLOYING LIGHTING TECHNIQUES DURING ON-ORBIT OPERATIONS

Charles D. Wheelwright/Jennifer R. Toole  
Lockheed Engineering & Sciences Co.  
Man Systems/Human Factors Engineering Dept.  
Houston, Texas 77058

Phone: 713-333-7815/333-7259  
FAX: 713-333-6626

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## ABSTRACT

As a result of past space missions and evaluations, many procedures have been established and shown to be prudent applications for use in present and future space environment scenarios. However, recent procedures to employ the use of robotics to assist crewmembers in performing tasks which require viewing remote and obstructed locations have led to a need to pursue alternative methods to assist in these operations. One of those techniques which is under development entails incorporating the use of suitable lighting aids/techniques with a closed circuit television (CCTV) camera/monitor system to supervise the robotics operations. The capability to provide adequate lighting during grappling, deploying, docking and berthing operations under all on-orbit illumination conditions is essential to a successful mission. Using automated devices such as the Remote Manipulator System (RMS) to dock and berth a vehicle during payload retrieval, under nighttime, earthshine, solar or artificial illumination conditions can become a cumbersome task without first incorporating lighting techniques that provide the proper target illumination, orientation, and alignment cues. Studies indicate that the use of visual aids such as the CCTV with a pretested and properly oriented lighting system can decrease the time necessary to accomplish grappling tasks. Evaluations have been and continue to be performed to assess the various on-orbit conditions in order to predict and determine the appropriate lighting techniques and viewing angles necessary to assist crewmembers in payload operations.